REPORT

ENVIRONMENTAL RESOURCES MANAGEMENT

Geophysical Survey Report for the Field North of Zeitler Road, Herron Farm Site, Elkton, Maryland

Herron 393, LLC

15 September 2005

WO No. 0025137

Environmental Resources Management, Inc.
200 Harry S. Truman Parkway, Suite 400
Annapolis, Maryland 21401

ERM®

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1.0 INTRODUCTION

Environmental Resources Management, Inc. (ERM) has prepared this report to document the performance and findings of the Geophysical Survey of the field north of Zeitler Road at the Herron Farm Site in Elkton, Maryland. The work was performed in accordance with ERM's 14 June 2005 Proposal for Geophysical Survey Services. The geophysical survey was conducted from 9 August to 11 August 2005.

2.0 BACKGROUND

A portion of the Herron Farm Site, known as Unit 2 (the Firehole), has recently been the subject of environmental investigations by the Maryland Department of the Environment (MDE) and the United States Environmental Protection Agency (US EPA). The environmental concerns at the Firehole are related to World War II-era ordnance manufacture and disposal activities in the area. Additional details about the site are provided in ERM's 2005 Phase I Environmental Site Assessment Report (ERM, 2005). As shown in Figure 1, Unit 2 is located south of Zeitler Road.

ERM subcontracted Advent Environmental, Inc. (Advent) to perform a geophysical survey of the field north of Zeitler Road. The objective of the survey was to determine whether UXO materials are present in the field, and if present, the horizontal extent of the materials. The area of the geophysical survey is shown in Figure 1.

3.0 METHODS

3.1 Task 1 UXO Avoidance

Advent provided a UXO specialist to accompany the geophysical team. The UXO specialist visually examined the ground surface in the work area and conducted a surface sweep with a hand held magnetometer to identify potential UXO in the work area. The presence of the UXO specialist during on-site work complied with the US EPA Health and Safety Plan for the Firehole site.

3.2 Task 2 Geophysical Survey

The geophysical survey was conducted using a Geonics EM-61 MkII (EM-61). Details on instrumentation and calibration are provided in Advent's

report in Appendix A. The EM-61 detects areas of varying electrical conductivity (i.e. high conductivity metallic debris versus low conductivity soils). The survey was conducted by traversing survey lines parallel to Zeitler Road. The survey lines extended from the wooded area adjacent to Laurel Run on the west to the homes located adjacent to the plowed field on the east. The survey lines were repeated moving northward, away from the road at a spacing of 3 feet. Additional survey lines were traversed until the survey technicians were certain that no signals indicative of UXO were being received. A total of 20 survey lines were completed and the geophysical survey area extended a total of 60 feet from Zeitler road.

The survey data were downloaded, along with surveyed GPS coordinates for survey line locations to plot the data. Prior to reducing the EM-61 data, a second sweep of the survey area was made with the EM-61 in order to manually locate and visually identify significant anomalies.

4.0 RESULTS

4.1 UXO Avoidance

The UXO Technician did not identify any potential UXO material north of Zeitler Road during the survey.

4.2 Geophysical Survey

Several low response conductive anomalies were detected throughout the survey area (signals ranging from 6 to 35 mV, with a background level of 0 mV.) Ten higher response anomalies (signals ranging from 35 to 65 mV) were also identified.

During the second sweep of the survey area to visually identify sources of anomalies, six high response points were identified. All six of these anomalies were found to be related to non-UXO items (primarily farm-equipment related scraps). Five of the six anomalies identified during the second sweep correlate to five of the ten anomalies detected during the geophysical survey.

The locations of all of the anomalies detected during the geophysical survey and second sweep of the survey area are included in Advent's report, which is included as Appendix A. Advent's report also includes physical descriptions of the material identified in the second sweep of the survey area.

5.0 *CONCLUSIONS AND RECOMMENDATIONS*

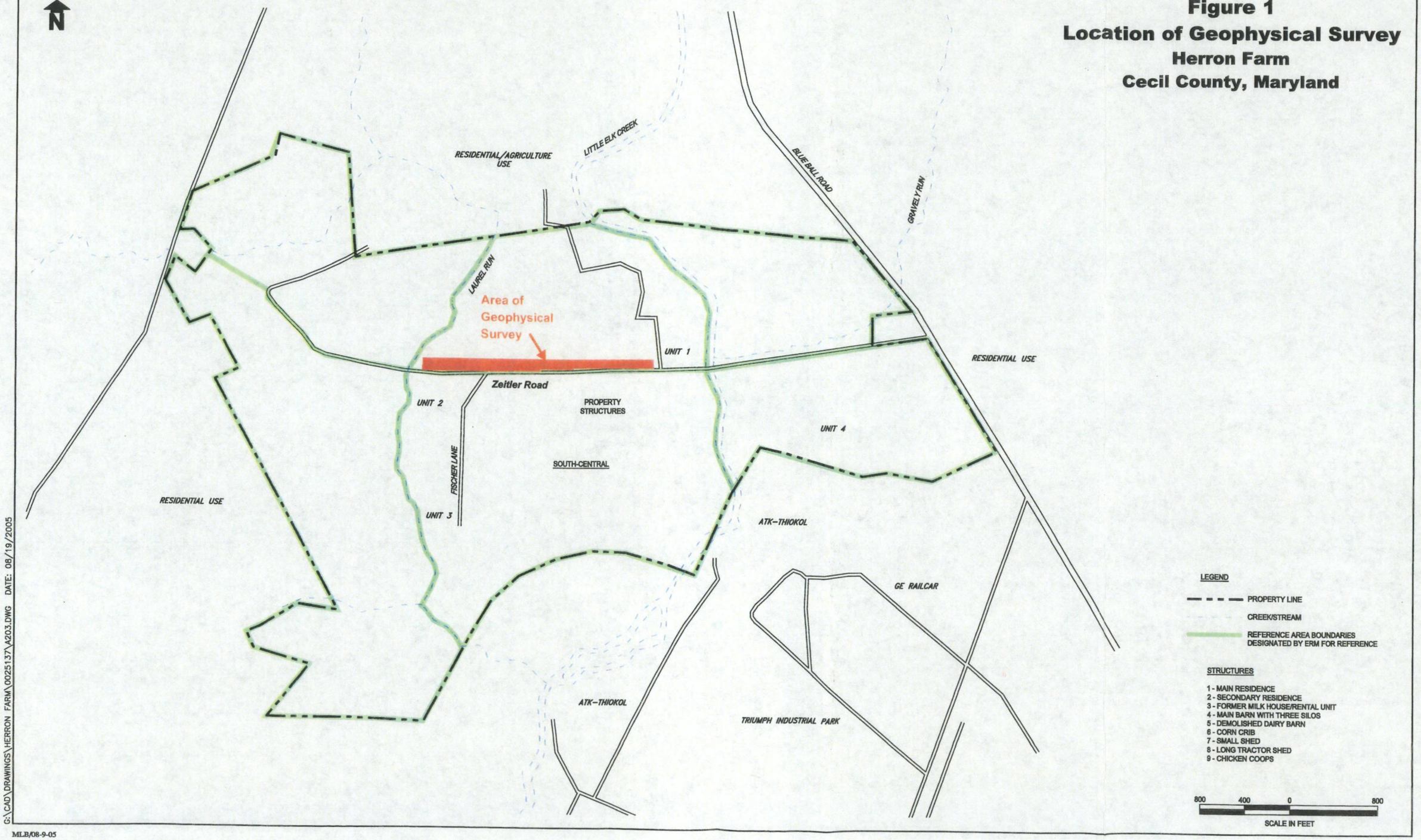
No UXO materials were identified in any part of the geophysical survey area. Therefore, ERM concludes that there is no evidence of UXO in the field north of Zeitler Road.

6.0 *REFERENCES*

ERM, 2005, *Phase I Environmental Site Assessment, Herron Farm Site.* Prepared by ERM for Herron 393, LLC. June 2005.

FIGURES

Figure 1
Location of Geophysical Survey
Herron Farm
Cecil County, Maryland



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ERM, INC.

Appendices

APPENDICES

APPENDIX A

GEOPHYSICAL SERVICES REPORT

ADVENT

September 14, 2005

ERM
200 Harry S. Truman Parkway, Suite 400
Annapolis, Maryland 21401
Office: 410.991.9460

Attention: Mr. Lenny Rafalko

Subject: **Geophysical Services Report**
Elkton Farm/Firehole Site
Elkton, Maryland
Subcontract: 0025137
ADVENT Project No. 05-515

Dear Mr. Rafalko:

ADVENT Environmental Inc. (ADVENT) is pleased to submit this report of geophysical services provided at the Elkton Farm/Firehole Site, near Elkton, Maryland, as agreed upon in our subcontract, 0025137 dated. 26 July, 2005. This report includes a description of the work performed at the Elkton Farm/Firehole Site on August 9th and 10th, 2005.

1.0 Background

The Elkton Farm site is located at 183 Zeitler Road. Elkton Maryland (Figure 1). The Elkton Farm site consists of approximately 400 acres and is situated in a rural setting just north of Triumph Industrial Park. The farm is currently owned by MARVA Limited Partnership. The Property has historically been used as a working farm. However, past land use in certain areas south of Zeitler Road, particularly Unit 2, referred to as the Firehole (Figure 2), included the disposal of ordnance and associated waste explosive materials from the early 1940s resulting from the effort to support World War II. The ordnance reportedly included 40-mm shells, rifle grenades, float lights, fuses, aircraft signals, detonators, primer caps, pentolite, incendiary bombs, and hand grenades.

2.0 OBJECTIVES OF GEOPHYSICAL SURVEY

The objective of this geophysical survey was to evaluate the field north of Zeitler Road to determine if farming activities spread unexploded ordnance (UXO) to this area from south of Zeitler Road. Figure 3 shows the area targeted by the geophysical survey.

3.0 SUMMARY OF GEOPHYSICAL ACTIVITES

3.1 Surface Sweep

Prior to beginning the geophysical survey, a surface sweep was conducted by ADVENT's UXO Technician and Staff Geologist/Engineer to determine if the area was free of surface UXO and safe to conduct a geophysical survey. The surface sweep consisted of a visual inspection of the work area assisted by a hand-held magnetometer. No ordnance or ordnance related items were identified during the surface sweep.

3.2 Geophysical Survey

After the surface sweep was completed, a geophysical survey was conducted using a Geonics EM-61 MkII (EM-61). The survey for the site was conducted along traversed survey lines at a spacing of no more than three (3) feet from one another.

Prior to collection of the geophysical data and periodically during the survey, the EM-61 was nulled at a location relatively free of metallic debris. The response and function of the unit was verified each morning by observing the instrument response to a metal ball. The response to the ball was compared to the response from the previous day. A shake test was also conducted by observing the instrument response while the coils and connecting cables were manipulated.

Data was collected continuously along the traverse lines. Differential GPS (DGPS) technology was utilized for spatial orientation of geophysical measurement points using a Trimble Pathfinder Pro XRS receiver mounted on the EM-61 Mancart and a backpack-mounted data logger. The use of integrated DGPS allowed ADVENT to simplify the data reduction process and increase spatial accuracy by producing a single data file. The GPS data indicated where the geophysical data points were using latitude and longitude as the coordinate system. The XRS receiver, using real-time satellite correction, is capable of 10 cm precision and routinely generates less than a one-meter error.

By using DGPS technology to locate data as it is collected, there was no need to lay out detailed survey lines using stakes, flagging, and rope. The surveyed area was walked using landmarks and basic grid points as guides for the geophysical survey crew. Once the data was downloaded, it was analyzed using the Oasis Montaj 6.0 software. This method of collecting data is more efficient with regard to actual field time than establishing survey lines in the field. The lines were roughly parallel to each other so that survey geometry could be easily estimated in the field.

3.3 Results of Surveys

The geophysical survey for the site was restricted to the field north of Zeitler Road (the bounding coordinates for the survey are listed in Table 1). The area covered by the geophysical survey included the area between the east and west boundaries, and extended approximately 60 feet to the north of Zeitler Road. The geophysical survey ceased once it appeared that there were no UXO in the area being surveyed. The rationale for this decision was based on the reasonable assumption that any UXO that could have been spread north of Zeitler road by farming activities would, if present, be concentrated in the area immediately north of the road. Based on the absence of UXO in this area, it is reasonable to conclude that UXO is also not further north of the completed survey area.

The EM-61 records data at each location at four separate time gates. These four separate readings are referred to as data channels. The early time gates, channels 1 and 2, typically represent shallow or surface items and the later time gate, channels 3 and 4, represent deeper items. By examining the later channels the effects of surface items such as fences can be reduced or eliminated. In some cases where shallow items and small deep items are the items, of interest all four channels can be summed.

Prior to reducing the data and demobilizing from the site, a second sweep of the survey area was performed using the EM-61 to locate high response targets manually. This field screening method uses the sum of all four channels to determine if metallic items are present. Six high response targets (the sum of all four channels >35mV) were located in the field. Once located, these targets were excavated, visually examined, and their position marked using a GPS. The objects identified were consistent with farming operations. Some of the items found were: a survey marker, a metal tine from a hay rake, and a piece of a plow tooth (a complete listing is present in Table 2). Anomalies less than 35 mV were considered relatively small, and would not be indicative of the large items of concern at this site including 40 mm shells, rifle grenades or hand grenades.

After the field activities were completed the data generated by the survey was reduced and maps of the survey area were completed. For this survey we selected to map the data from channel 3. Typically this data is used because it minimizes the effect of surface items. Results of the survey are presented in Figures 4 to 10. The results of the manual sweep and excavation of high response items are listed in Table 2. Results of the survey indicate primarily items of relatively low response and 10 items of higher (>35mV Channel 3) response that were distributed in the area immediately adjacent to Zeitler Road. All items exhibiting a response >6mV are indicated with a "+" on the maps. This response level was selected so that small items would still be included in target selection. As mentioned above, anomalies less than 35 mV were considered relatively small. Large UXO would be expected to have a higher response.

4.0 Conclusions/Recommendations

No UXO items were identified during the surface sweep. Six (6) objects of note (Table 2), none UXO related, were identified during the field screening. In conclusion no evidence was found to indicate that UXO are present in the field north of Zeitler Road. Should additional assessment be required the remaining items detected by the data reduction could be excavated.

It has been a pleasure serving you on this project. As always, please do not hesitate to contact us at (843)-388-1851 should you have any questions regarding this correspondence.

Sincerely,

ADVENT

FOR
Larry N. Fowler, E.I.T.
Project Manager
LNF/JCS: vgb

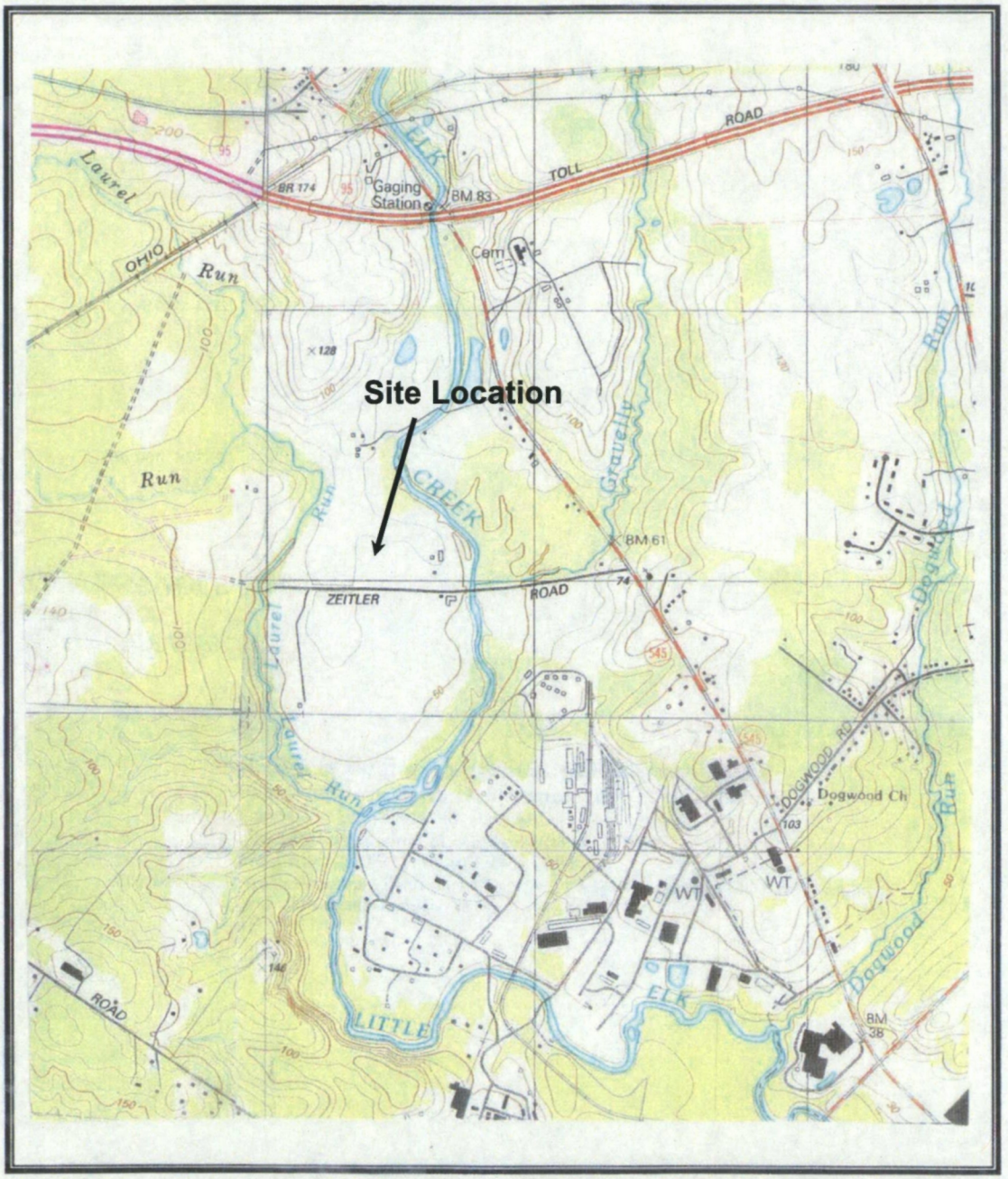
Jeffrey C. Smoak, P.E.
Principal

Attachments: Appendix A Figures
Appendix B Tables

APPENDIX-A

FIGURES

Figure 1
Site Location
Herron Farm
Elkton, Maryland



USGS Elkton, Bay View, and North East Quadrangles, Maryland
USGS Newark West Quadrangle, Delaware
7.5 Minute Series Topographic

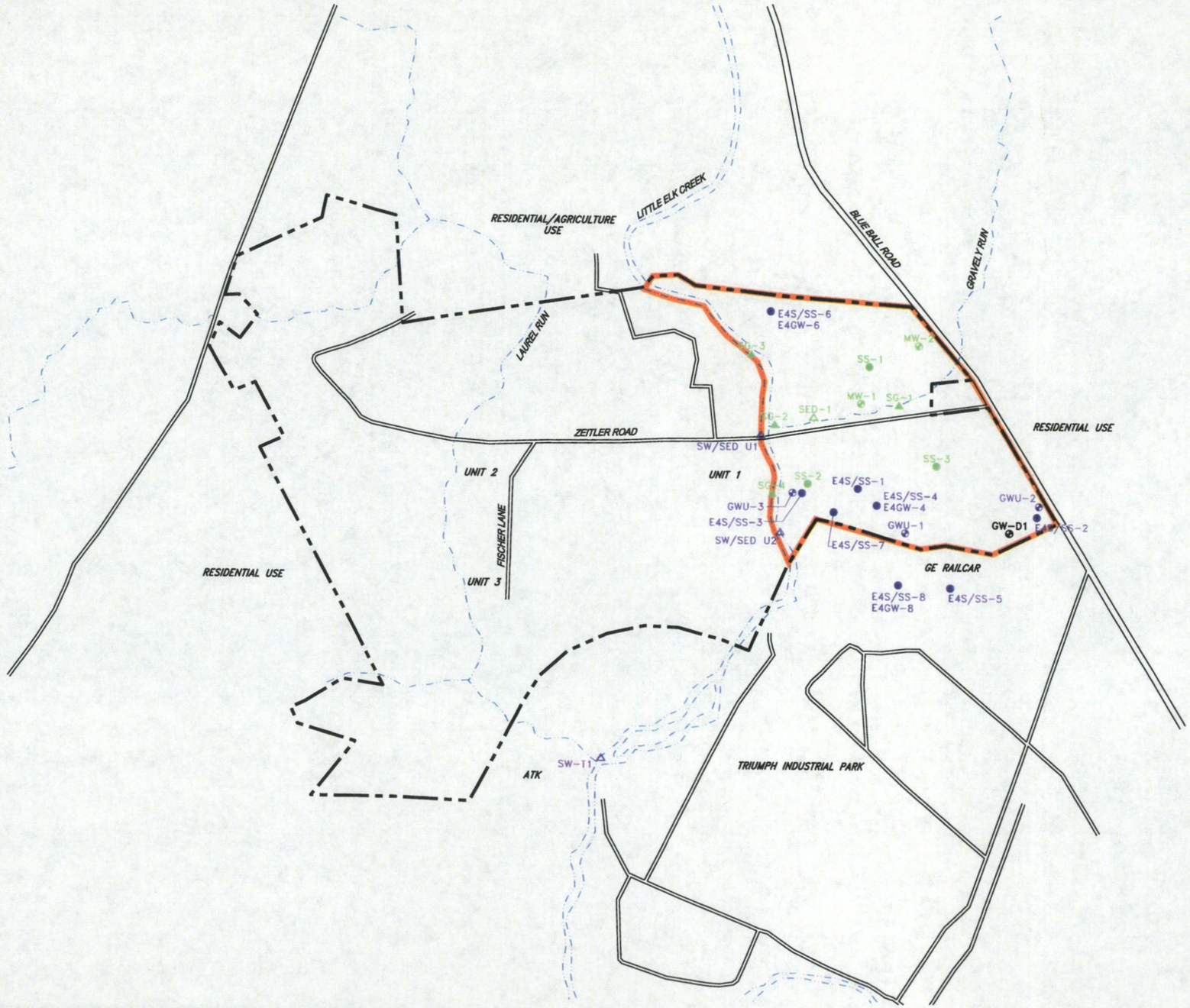
SCALE 1 : 24,000

1 .5 0 1 MILE

CONTOUR INTERVAL 20 FEET

W.O.#0025137

FIGURE 2
SITE LAYOUT AND SAMPLE LOCATIONS
HERRON FARM
CECIL COUNTY, MARYLAND



LEGEND

- PROPERTY LINE
- CREEK/STREAM
- UNIT 4 BOUNDARY
- HERRON DOM. SITE WELL

INSTALLED/SAMPLING LOCATION BY ERM

- MONITORING WELL
- STREAM GAUGE
- SEDIMENT SAMPLE
- SOIL SAMPLE LOCATIONS

INSTALLED/SAMPLING LOCATION BY MDE

- MONITORING WELL
- SEDIMENT SAMPLE
- SOIL SAMPLE LOCATIONS

1000 500 0 1000

SCALE IN FEET

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MLB/05-26-05

ERM, INC.

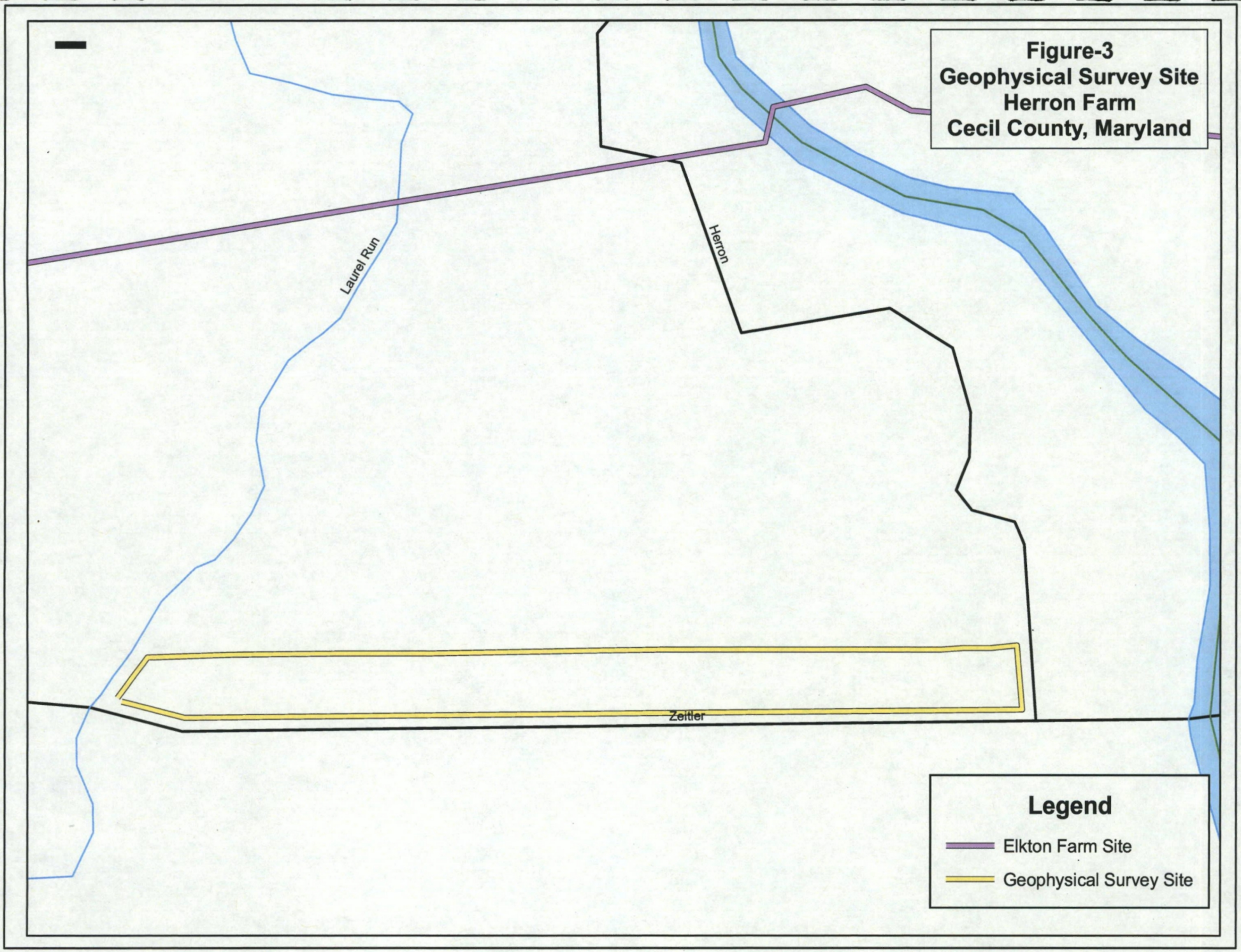
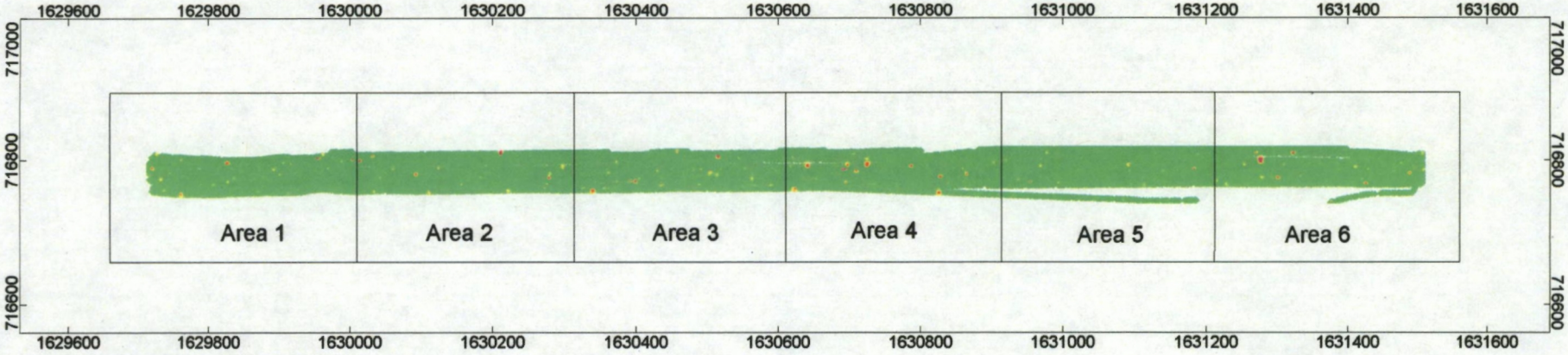
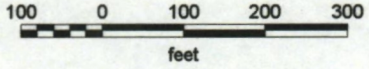


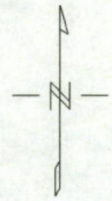
Figure-3
Geophysical Survey Site
Herron Farm
Cecil County, Maryland
Laurel Run
Herron
Zeitler
Legend
Elkton Farm Site
Geophysical Survey Site

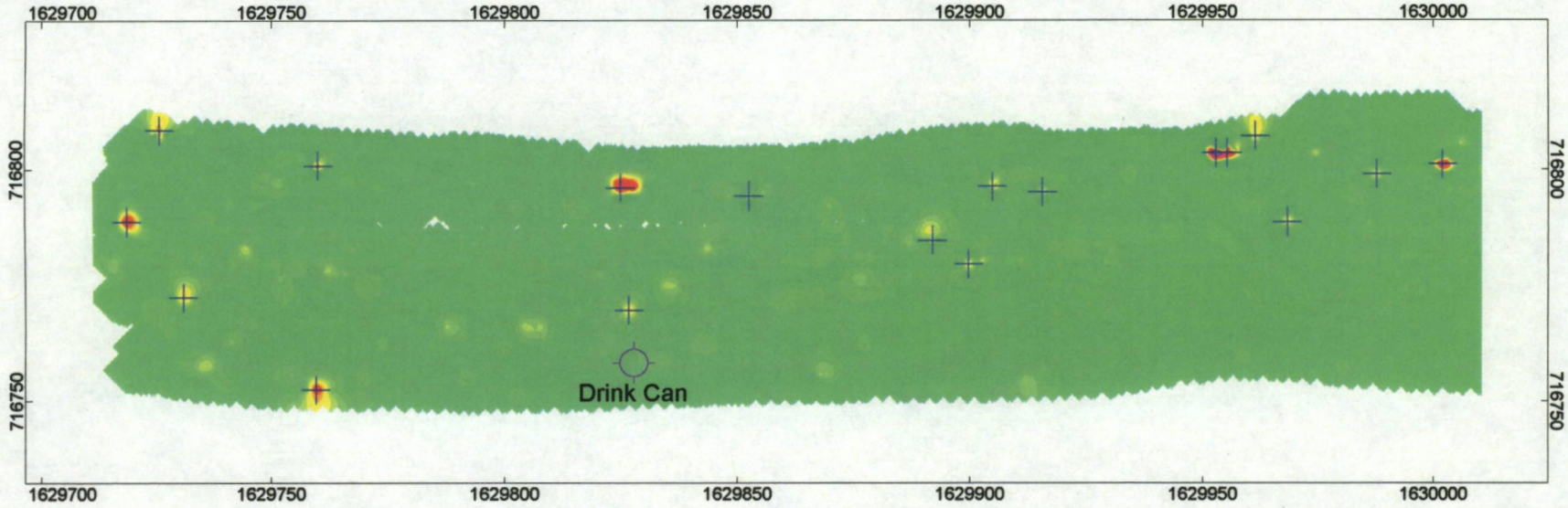




Elkton Farm/Firehole Site

Area Map



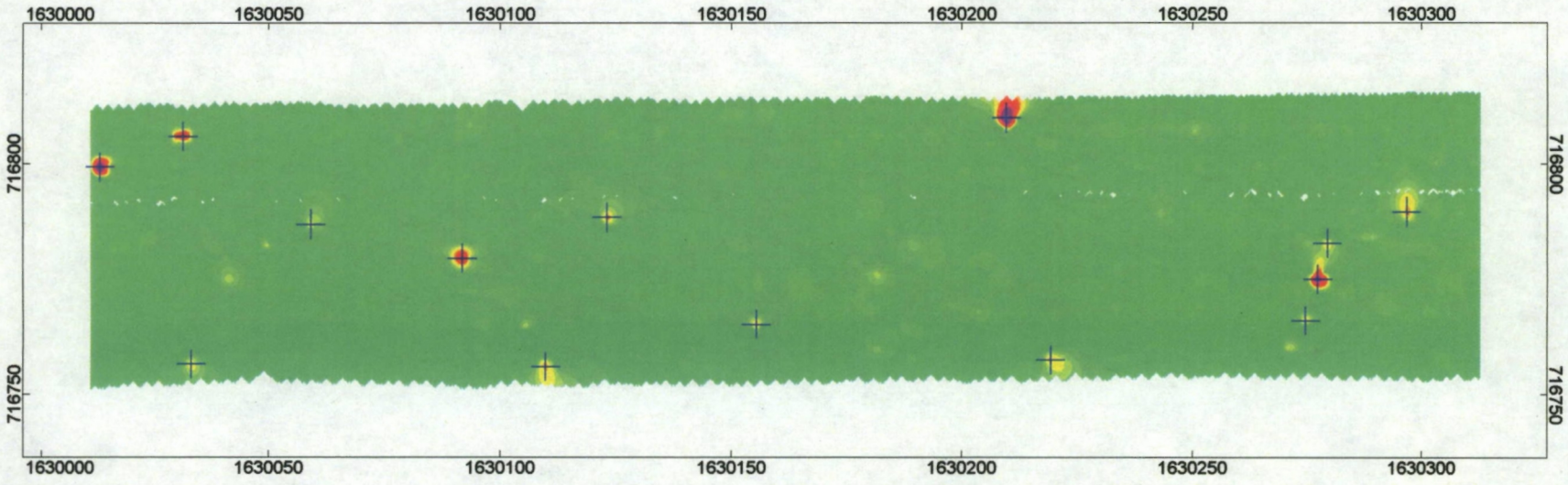


25 0 25
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 1

>6mV
Dig

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61
[mV]

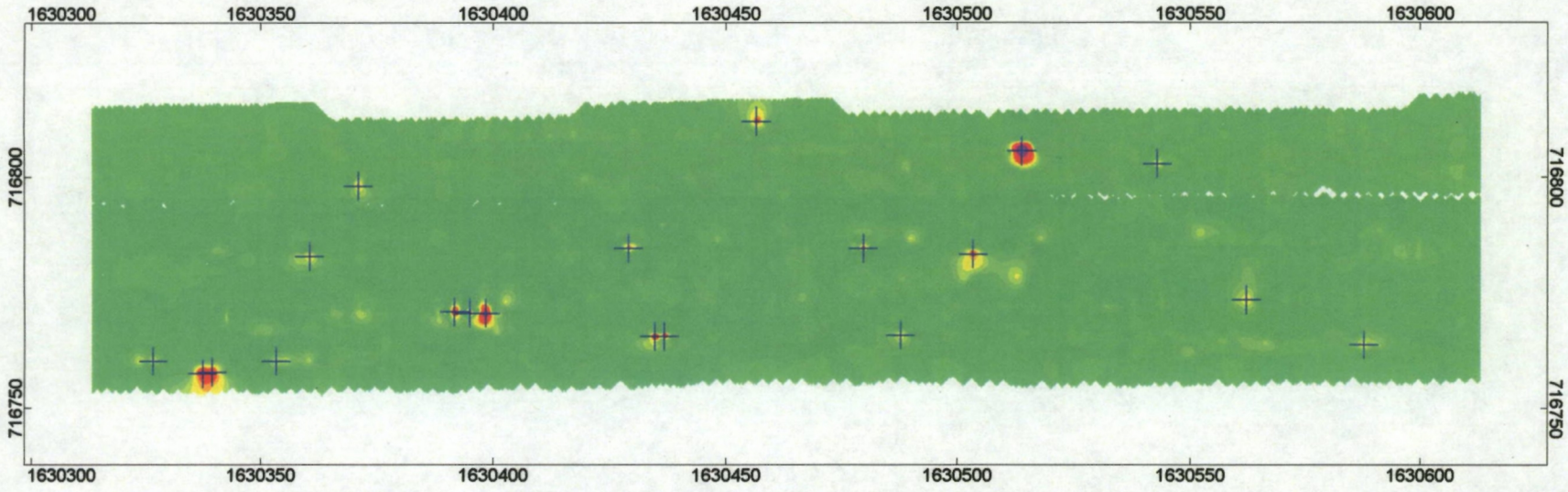


25 0 25 50
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 2

>6mV

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61 [mV]

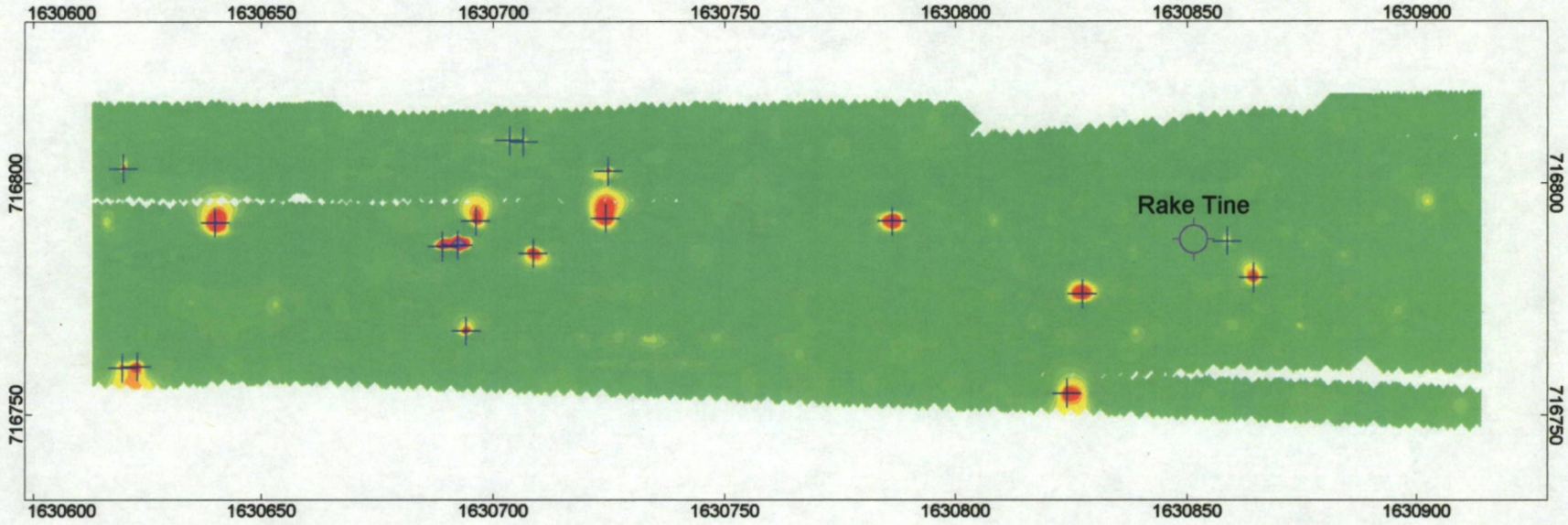


25 0 25
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 3

>6mV

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61
[mV]

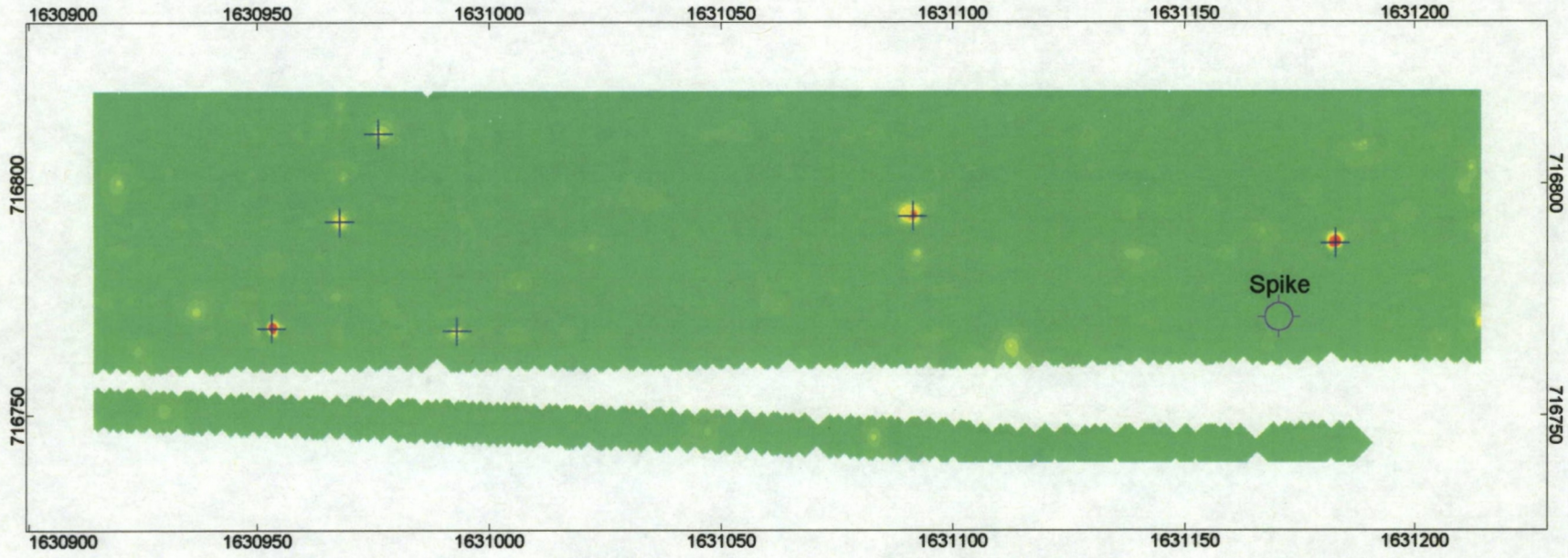


25 0 25
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 4

>6mV
Dig

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61
[mV]

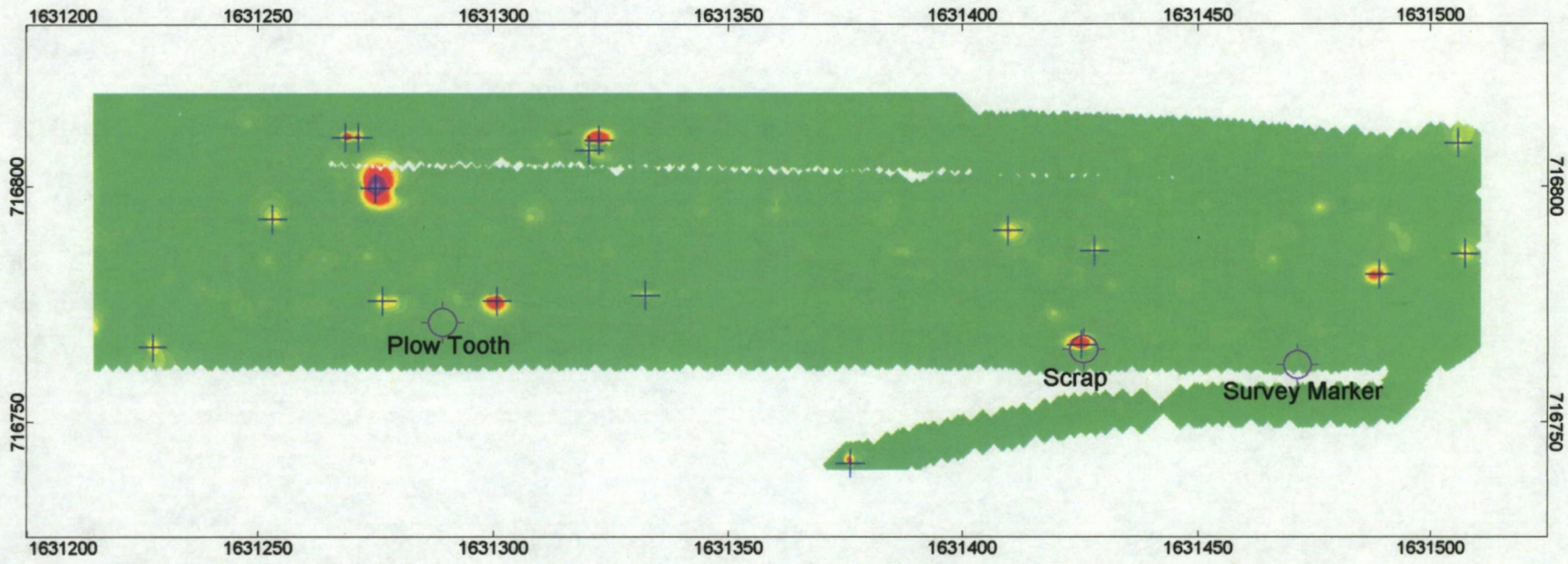


25 0 25
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 5

>6mV
Dig

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61
[mV]



25 0 25
feet

Elkton Farm/Firehole Site
EM61 Target Picks
Area 6

>6mV
Dig

51.0
47.9
44.9
41.8
38.8
35.7
32.7
29.6
26.6
23.5
20.4
17.4
14.3
11.3
8.2
5.2
2.1
-0.9
-4.0
EM61
[mV]

APPENDIX-B

TABLES

Bounding Coordinates	
Site	**Coordinates**
Southeast corner of field at Zeitler Road	North: 716764.412 East: 1631521.077
Gravel Road Leading from Zeitler Road to Farm Buildings	North: 716752.026 East: 1630855.509
Southwest corner of field at Zeitler Road	North: 716735.471 East: 1629721.857
Northwest corner of field	North: 717722.710 East: 1630151.493
Gravel Road Leading from Zeitler Road to Farm Buildings (North End)	North: 717618.849 East: 1630725.410
Northeast corner of field	North: 717547.361 East: 1631415.302

Table-1. *Bounding Coordinates for the Survey Site with a listing of physical features found at that location.*

Excavation Coordinates			
ID	**Signal Strength**	**Location**	**Results**
1	50mV	North: 716762.3 East: 1631471.2	Survey Marker
2	52mV	North: 716765.6 East: 1631425.7	Metal Scrap
3	65mV	North: 716758.4 East: 1929827.6	Beer Can
4	42mV	North: 716788.0 East: 1620851.3	Hay Rake Tine
5	36mV	North: 716771.3 East: 1631289.2	Plow Tooth
6	62mV	North: 716771.5 East: 1631170.2	6" Spike

Table-2. *Coordinates and description of items excavated upon reacquisition at site.*